Sequential experiment design to explore failure modes with masked, slow kinetics

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ABSTRACT

Failure modes with masked, slow kinetics are the bane of reliability engineers. A masked failure mode in a “typical” accelerated test never shows up, either because another failure mode completely censors it at the (usually) highly accelerated test conditions, or because the failure kinetics/physics is self masking. The masking failure mode, if present, is often irrelevant at operating conditions. If the masked failure mode is relevant at operating conditions, this can cause significant loss.

There are two situations one can be in with respect to masked failure modes.

i) A masked or self masking failure mode has appeared in operation, and the problem is to identify what part of the population is at risk and develop a screening procedure.

ii) The device/material system is still in qualification, and the question is to determine what risk there is of a masked or self masking failure mode.

In this paper sequential experimental strategies appropriate to each of these situations are developed.

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